the light path can be altered, thereby changing the spot patterns and consequently the details of the various methods using the electrically converted spot patterns.

What is claimed is:

1. A lens device comprising:

a lens focussing light into a focal zone and having a predetermined effective diameter; and

light controlling means provided in a light path of said lens for preventing light in an intermediate axial region of said light path from reaching said focal zone, said intermediate axial region being located between near axial region which includes a center of said light path and a far axial region located radially outward from said intermediate region, said light controlling means permitting light in said near and far regions of said light path to reach said focal zone without imposing a relative phase change between light in said near and far regions.

2. A lens device according to claim 1, wherein said lens is an objective lens.

3. A lens device as claimed in claim 1, wherein said light controlling means blocks the light in the intermediate region of said light path.

4. A lens device as claimed in claim 1, wherein said light controlling means scatters the light in the intermediate region of said light path.

5. A lens device as claimed in claim 1, wherein said light controlling means diffracts the light in the intermediate region of said light path.

6. A lens device as claimed in claim 1, wherein said light controlling means absorbs the light in the intermediate region of said light path.

7. A lens device as claimed in claim 1, wherein said light controlling means reflects the light in the intermediate region of said light path.

8. A lens device as claimed in claim 1, wherein said light controlling means transmits the light in the intermediate region of said light path in a direction irrelevant to said focal zone.

9. A lens device as claimed in claim 1, wherein said light controlling means refracts the light in the intermediate region of said light path in a direction away from said focal zone.

10. A lens device as claimed in claim 2, wherein said light controlling means controls the light in the intermediate region between near and far axes of the incident light beam by at least one of blocking, scattering, diffracting, refracting, absorbing, transmitting, and reflecting.

11. A lens device as claimed in claim 1, wherein said light controlling means has a predetermined region for preventing light in an intermediate axial region of said light path from reaching said focal zone, said predetermined region having an outer diameter smaller than the effective diameter of said lens.

12. A lens device as claimed in claim 1, wherein said light controlling means is at least one light controlling film of a predetermined pattern located on said lens.

13. A lens device as claimed in claim 1, wherein said light controlling means includes a transparent member.

14. A lens device as claimed in claim 13, wherein said transparent member is spaced apart from said lens by a predetermined distance.

15. A lens device as claimed in claim 13, wherein said transparent member includes at least one light controlling film of a predetermined pattern.

16. A lens device as claimed in claim 1, wherein said light controlling means includes at least one light controlling film of a predetermined pattern located on said lens.

17. A lens device as claimed in claim 1, wherein said light controlling means includes at least one surface irregularity of a predetermined pattern.

18. A lens device as claimed in claim 17, wherein said at least one surface irregularity includes a groove having two converging side walls, the angle at a point of said conversion being less than 90°, wherein one of the side walls has a predetermined slope with respect to an axis of said light path.

19. A lens device as claimed in claim 18, wherein said groove is V-shaped.

20. A lens device as claimed in claim 1, wherein said light controlling means includes at least one surface irregularity of a predetermined pattern, and said at least one surface irregularity includes a groove which has parallel sides and said lens is a planar lens.

21. A lens device as claimed in claim 17, wherein said at least one surface irregularity includes a protruding wedge-shaped rib.

22. A lens device as claimed in claim 1, wherein said light controlling means includes at least one surface irregularity of a predetermined pattern, and said at least one surface irregularity includes a roughened surface.

23. A lens device as claimed in claim 17, wherein said surface irregularity includes a diffraction lattice for diffracting the light in said intermediate region of said light path away from said focal zone.

24. A lens device according to claim 1, wherein said lens has a refractive surface.

25. A lens device according to claim 1, wherein said lens is a diffractive lens.

26. A lens device according to claim 1, wherein said lens is a planar lens.

27. A lens for use with optical memory disks of at least two types, each type being distinguished from another by having information bearing levels at different locations along axes of said optical memory disks, comprising:

a near axial region which includes a center of a light path;

an intermediate axial region being located radially outward from said near axial region; and

a far axial region located radially outward from said intermediate region,

wherein said near region focuses light in said light path on the information bearing level regardless of which of said at least two types of optical memory disks.

28. A lens according to claim 27, wherein said lens permits light in said far axial region to focus on said optical memory disk of one type of optical memory disk, but not another.

29. A lens device as claimed in claim 27, wherein said lens scatters, diffracts, absorbs, reflects or diverts light away from said light path.

30. An optical pick-up device for use with optical memory disks of at least two types, each type being distinguished from another by having information bearing levels at different locations along axes of said optical memory disks, comprising:

a light source;

an objective lens;

a photodetector which detects light transmitted through said objective lens and focused on said photodetector after being reflected by a disk;

wherein said lens includes

a near axial region which includes a center of a light path;

an intermediate axial region being located radially outward from said near axial region; and

a far axial region located radially outward from said intermediate region,

wherein said near region focuses light in said light path on the information bearing level regardless of which of said at least two types of optical memory disks.

31. An optical pick-up device according to claim 30, wherein said lens focuses light in said far axial region on said photodetector for one type of optical memory disk, but not another.

32. A lens device for use with optical memory disks of at least two types, each type being distinguished from another by having information bearing levels at different locations along axes of said optical memory disks, comprising:

a lens focusing light into said information bearing levels and having a predetermined effective diameter; and

a light controller provided in a light path of said lens which controls light in said light path before reaching said information bearing levels, said light controller includes a near axial region which includes a center of said light path, an intermediate axial region being located between near axial region and a far axial region located radially outward from said intermediate region, said light controller permitting light in said near region of said light path to focus on the information bearing level regardless of which of said at least two types of optical memory disks.

33. A lens device according to claim 32, wherein said light controller permits light in said far axial region to focus on said optical memory disk of one type of optical memory disk, but not another.

34. A lens device as claimed in claim 32, wherein said light controller scatters, diffracts, absorbs, reflects or diverts light away from said light path.

35. A lens device as claimed in claim 32, wherein said light controller is integral with said lens.

36. A lens device as claimed in claim 32, wherein said light controller is separate from said lens.

37. An optical pick-up device for use with optical memory disks of at least two types, each type being distinguished from another by having information bearing levels at different locations along axes of the optical memory disks, comprising:

a light source;

an objective lens;

a photodetector which detects light transmitted through said objective lens and focused said photodetector after being reflected by a disk;

light controller provided in a light path of said lens which controls light in said light path before reaching said photodetector, said light controller includes a near axial region which includes a center of said light path, an intermediate axial region being located between near axial region and a far axial region located radially outward from said intermediate region, said light controller permitting light in said near region of said light path to focus on the information bearing level regardless of which of said at least two types of optical memory disks such that light in said near axial region reaches said photodetector.

38. An optical pick-up device according to claim 37, wherein said light controller permits light in said far axial region to focus on said photodetector for one type of optical memory disk, but not another.

39. An optical pick-up device as claimed in claim 37, wherein said light controller is integral with said objective lens.

40. An optical pick-up device as claimed in claim 37, wherein said light controller is separate from said objective lens.